

ES4SB220 FILTER CAPACITOR BLOCK v1.0 ASSEMBLY & INSTALLATION INSTRUCTIONS

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PARTS SUPPLIED WITH THIS KIT

- | | |
|---|--|
| (1) ES4SB220 Filter Capacitor Block v1.0 PC Board | (8) 100kΩ 5-Watt Resistors |
| (8) 330μF 450VDC Electrolytic Capacitors | (1) #4 Solder Lug |
| (1) #4-40 x 1/4" Machine Screw | (1) #4-40 Nut with Captive Lock Washer |

WARNING: Voltages inside the amplifier CAN & WILL KILL YOU! You MUST also know how to work around HIGH VOLTAGE safely. If you do not, get assistance from someone who does.

- () **Read, re-read and fully understand these instructions prior to beginning this upgrade.** Make sure to perform the steps in the order they are listed. Also, be sure to label wires as they are disconnected from various points inside the amplifier. This will help when the time comes to re-attach the wires that will be disconnected during installation of the kit.

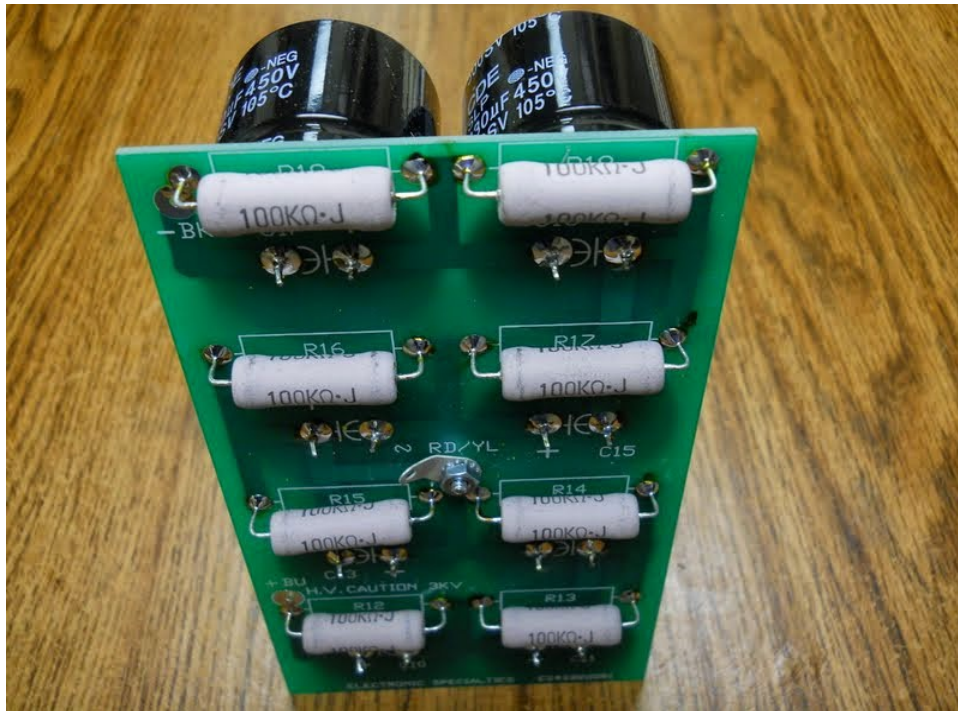
PRELIMINARY INFORMATION

The filter capacitor block may be installed by itself as an upgrade in an amplifier which is in operating condition regarding the high voltage power supply. If the amplifier is not in known good operating condition, the condition of the HV rectifier/metering board must be determined before proceeding with installation of the new filter capacitor block. Harbach Electronics, LLC and Electronic Specialties will not be responsible for damage to the new filter capacitor block caused by shorted diodes or resistors on the HV rectifier/metering board. Please check the diodes and resistors on the HV rectifier/metering board with a multi-meter before proceeding with the installation. A new replacement diode board which we recommend is available from Harbach Electronics, LLC (RM-220). This board replaces the original components with higher rated components than the original SB-220/SB-221 utilized and it also replaces the troublesome and expensive bias zener diode with a simple series string of power diodes. **Again, proceed with the installation of the new filter capacitor block only after the condition of the HV rectifier/metering board is determined to be satisfactory.**

ES4SB220 FILTER CAPACITOR BLOCK ASSEMBLY INSTRUCTIONS

- () **The silk screening and foil traces are located on the BOTTOM side of the PCB. The TOP side of the PCB is blank (no traces and no silk screening).**
- () Install the solder lug on the **BOTTOM** (foil) side of the printed circuit board (PCB) at the large hole near center of the PCB marked **RD/YL** using the #4-40 machine screw and nut. The nut and solder lug should be on the **BOTTOM** (foil) side of the PCB. Bend the tang on the solder lug away from the PCB at a slight angle. Tighten the nut securely.

- () Install and solder resistors R12-R19 to the bottom (foil) side of the PCB according to parts layout diagram. Resistors R12-R19 must be raised slightly above the PCB, but no more than 1/4". Clip the resistor leads flush with the top (silk screened) side of the PCB after soldering in place.
- () Insert electrolytic capacitors C10-C17 into the **TOP** (blank) side of the PCB. Capacitors C10-C17 mount on the **TOP** (blank) side of the PCB and are soldered on the **BOTTOM** (foil) side of the PCB. **Be sure to observe the correct polarity when installing the capacitors. There is a stripe down the side of the capacitors which denotes the negative lead.** Place the PCB with the capacitors installed against a hard level surface to ensure that capacitors are inserted completely and properly aligned BEFORE soldering. Solder the capacitor pins to the PCB and trim the sharp points of the capacitor pins after soldering.
- () The assembled PCB should look like the picture below when assembly is completed.



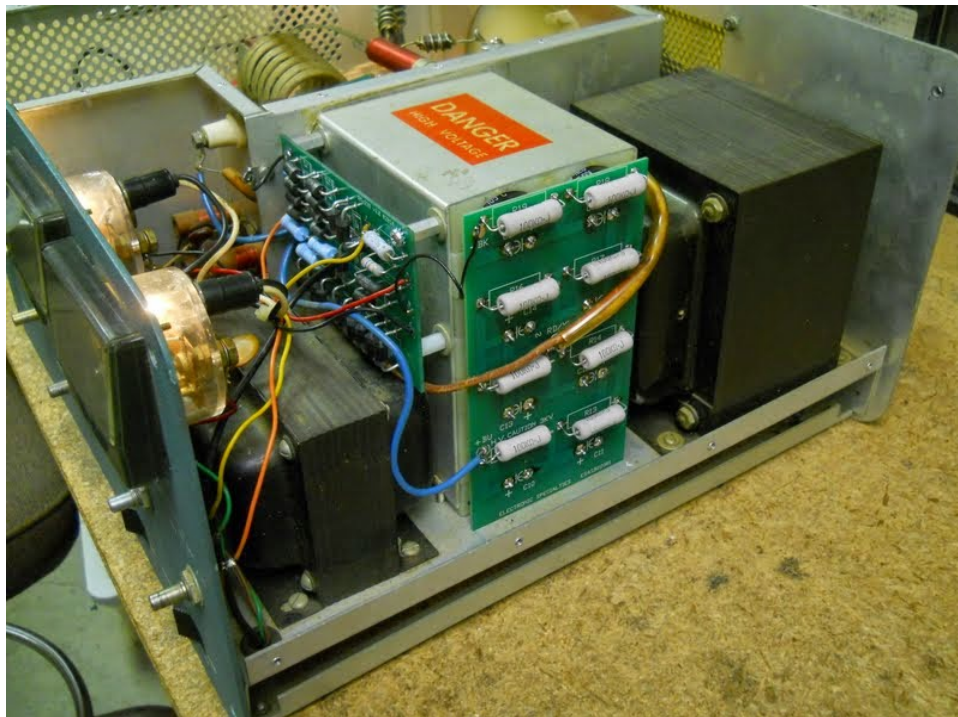
ES4SB220 FILTER CAPACITOR BLOCK INSTALLATION INSTRUCTIONS

- () Unplug the amplifier power cord from the AC mains and let any high voltage stored in the electrolytic capacitors bleed down. Verify the HV has bled down as shown on the HV meter. Place the amplifier on a book, front panel up, and remove the bottom screws holding the feet and case in place.
- () Remove any cables connected to the amplifier.
- () With the amplifier facing you remove the right side end cover which exposes the filter capacitor block.
- () Use a shorting bar or "chicken stick" to short the HV to ground to make sure any high voltage is completely bled off from the capacitors.
- () Disconnect three (3) wires from the filter capacitor block. **BLACK (BK)** is the negative lead from the rectifier/metering board and is attached near the top of the filter capacitor block. **BLUE (BU)** is the B+ lead from the rectifier/metering diode board and is attached near the bottom of the filter capacitor block. **RED/YELLOW (RD/YL)** is the lead from the HV transformer attached to a point near the center of the filter capacitor block.

- () Turn the amplifier on its left side to expose the bottom of the chassis. Remove the four (4) nuts and lock washers which secure the U-shaped metal cover over the filter capacitor block. This will allow the cover and block to be moved sufficiently to allow the original electrolytic capacitors and attached bleeder resistors to be removed from the plastic blocks. Depending on age of unit, you may have to remove the cover and filter block assembly completely to remove the capacitors from the plastic holders.
- () Slide the new filter capacitor block assembly into the plastic blocks. Install such that the terminal **BK** is at the top. **DO NOT slide or force the new capacitors all the way into the plastic holders.** Apply even pressure on the board while assembling and leave approximately 1/4" space between the top (silk screened) side of the PCB and the outside edge of the plastic blocks. **Be careful not to damage the resistors mounted on the circuit board during this step.**

Note: If the plastic holders/spacers in your amplifier are damaged or melted, you can remove and rotate them 180 degrees and use the undamaged end for mounting the new filter capacitor block assembly.

- () Re-install the metal cover over the filter capacitor block (if removed). Re-install the lock washers and nuts and tighten to secure the complete assembly to the chassis.
- () Solder the three (3) wires to the new filter capacitor block circuit board as follows: **BLACK** to terminal **BK**, **BLUE** to terminal **BU** and **RED/YELLOW** to the solder lug **RD/YL** near center of the PCB.
- () The amplifier and new filter capacitor block should look like the picture below once installation is completed.



- () Inspect your work for any wire clippings, wires touching other components, solder splashes, or anything which could potentially cause a short circuit.
- () Replace the right side end cover on the amplifier and return the chassis to normal operating position.

Note: You may want to check the amplifier operation at this point before re-installing in the cabinet. If you choose to do this, EXERCISE EXTREME CAUTION! Connect the amplifier to the AC power source and with the MODE switch in CW position and MULTIMETER switch in HV position. Turn the amplifier on. The HV should read approximately 2400VDC with the MODE switch in the CW position and 3100 VDC in the SSB position (depending on your AC mains voltage). If everything is satisfactory, turn the amplifier OFF, disconnect the AC power source and wait for the HV to discharge to zero before attempting to re-install the amplifier in its cabinet.

() Re-install the amplifier in the cabinet and re-connect all cables.

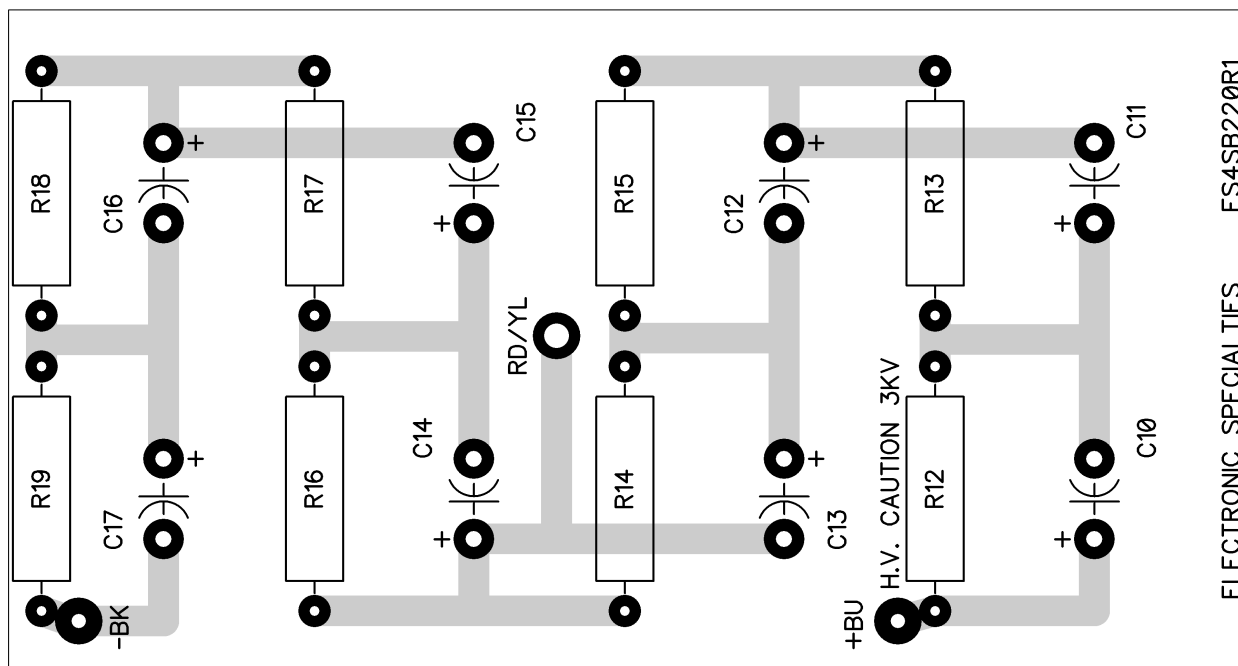
Installation of the ES4SB220 filter capacitor block is complete and the amplifier is ready for service.

In case of difficulty or if you have questions or comments please contact Electronic Specialties by telephone at (641) 472-7084 9am to 5pm CST M-F or anytime via email at elespe@lisco.com

Thank you,
Paul Kraemer K0UYA

PRINTED CIRCUIT BOARD LAYOUT (BOTTOM SIDE VIEW)

C10-C17 330µF 450VDC Electrolytic Capacitors **R12-R19** 100KΩ 5-Watt Resistors
L1 (RD/YL) #4 Solder Lug & Mounting Hardware



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